DOCUMENT RESUME

ED 324 963 FL 018 950

AUTHOR Lebeaupin, Thierry
TITLE Science as a Foreign Language: Which Language Teaching Methodology for Scientists?
PUB DATE Apr 90
NOTE 11p.; Paper presented at the World Congress of Applied Linguistics sponsored by the International Association of Applied Linguistics (9th, Thessaloniki, Greece, April 15-21, 1990).
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Classroom Techniques; *Discourse Analysis; Foreign Countries; *Languages for Special Purposes; *Science Instruction; Second Language Instruction; Teaching Methods; Technical Writing; *Vocabulary Development

ABSTRACT

A discussion of the teaching of scientific discourse to non-native speakers focuses on two areas: (1) characteristics commonly attributed to scientific language and their implications; and (2) the difficulties experienced at the language-teaching level in teaching theoretical discourse. It is commonly assumed that scientific discourse is monosememic (each term covers one concept), impersonal, and objectivized. Several types of scientific discourse are distinguished, including: that used for research and among specialists; that used for information dissemination to a wider audience; and pedagogical language for popularized science. All discourse types are seen as forms of theoretical discourse. Students of scientific discourse are faced with the same problems as students of general language: constructing a logical, rigorous, and coherent argument adapted to a specific audience. However, some skills in planning discourse needed for the sciences are not taught in general language courses. Foreign language courses for scientists also tend to accord too much priority to written language. Spoken scientific dialogue is very different from the written variety and requires more than manipulating instrumental vocabulary. It requires the elaboration of concepts and skills in listening, attending, and adapting. (MSE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
T. Lebeaupin
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED324963

SCIENCE AS A FOREIGN LANGUAGE
Which language teaching methodology for scientists?

By Thierry Lebeaupin
Centre de Linguistique Appliquée, Besançon, France

Functional language teaching today

Since 1975, the problems of foreign language teaching for scientists - and more particularly the problems of teaching one's own language to foreign scientists - have been of variable prominence. In 1975, in the early days of the notional/functional debate, the topic was at the leading edge of teaching preoccupations, and it had the merit of dealing with discourse, i.e. the text behind the sentence. Subsequently, this aspect gave way to a more communicative approach, less concerned with discourse than with situational utterance. The argument has now turned full circle, and we have come back to the same preoccupations as 15 years ago.

The precise direction that science language teaching should take has still to be determined. Although linguistic analysis has been applied to individual lines of discourse, there have as yet been no spinoffs for language teaching. However, given the demand, it is now a matter of urgency for all languages to be taught in their discursive and textual aspects, in order to generate an appreciation of their facilities for exposition and logical cohesion.

The question has to be seen from both sides: firstly, a number of characteristics commonly attributed to scientific language need to be examined; secondly, the difficulties experienced at language teaching level have to be confronted. These difficulties relate in particular to the utterance or understanding of all theoretical discourse.

FL018950

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Of Scientific Discourse

Scientific discourse is commonly - and simplistically - assumed to be:

- monosememic: each term covers one and only one concept.
- impersonal: facts speak for themselves.
- objectivised: value judgments have been eliminated.

There is a resulting tendency to believe that all discourse between scientists is a concentrate of these three characteristics, whilst the language of popularised science is a degradation of this Discourse of Truth.
In fact, it can be observed that pedagogical discourse is often more impersonal and objectivised than the language that scientists use among themselves. Since the author of a didactic textbook has no personal stake in resuming the current state of knowledge, but is simply presenting recognised facts, didactic works can afford to be more detached. The net social effect nevertheless corresponds to a Discourse of Truth.

It can also be noted that the "monosememic" term is an ideal that is never attained, that the desire for objectivisation does not exclude polemic argument and that the impersonality found in certain texts bears little relation to the language spoken in the laboratory. Lavoisier's experiment protocols, for example, were at the time written in the first person, and any scientist presenting a thesis today is obliged to give utterance to personally coined neologisms in order to obtain recognition of new facts.

Typological classifications fluctuate, because the area occupied by popularisation is not easily demarcated, and whilst popularisation has to be differentiated from actual research, nobody knows exactly where it begins and ends.

In fact, there are several different types of scientific discourse. Research (articles for peers, theses and discussions between specialists), distribution (publications for a wider audience) and education (pedagogy) all play their part, and their discursive forms have specific social functions which cannot be ignored. They are all subsets of theoretical discourse as a whole, a broader concept which our students find difficult to apprehend.

Theoretical Discourse

This type of discourse characterises any intellectual and linguistic effort towards abstraction with respect to the referent and the situation of utterance. It aspires to the language of exposition. In this respect, the squabbles over whether or not it is necessary to teach foreign students "general language" before starting a course in "specialised language(s)" are fruitless, since nobody is able to define precisely what is meant by "general language", in particular when applied to discourse.

"General language" is an unsatisfactory term both at the linguistic level, where textual discourse and grammar are often excluded, and at the pragmatic, or functional, level, in that "general" does not indicate anything of the context or particular objective in a given situation of utterance. As for the cognitive level, nobody knows how the notion of "general language" copes with the task of organising thought into intellectual structure. It cannot be used to construct a typology of spoken or written discourse or any particular linguistic description.
In fact, the notion is particularly oriented towards devising language teaching programmes for scientists. Its usefulness has been to highlight - by identifying - the notion of "scientific specialities".

Meanwhile, the difficulties facing students remain the same. They still find it just as hard, after an initial course in "general language", to construct a logical, rigorous and coherent argument adapted to a specific audience, despite ample apparent communicative skill. Study in a foreign language, regardless of the subject-matter, evidently confronts students with problems in the selection and hierarchical arrangement of information, because they soon lose themselves in a maze of pedagogical paraphrases originally supplied by teachers as possible ways of elucidating their argument. It is one thing to perceive a fact; it is quite another to grasp its many possible modes of expression. This aptitude is every bit as cultural as linguistic.

It is true that students have to learn to identify and use certain linguistic resources that are specific to theoretical discourse, such as:

- rhetorical or connective organisers,
- temporal or chronological organisers and time relations,
- anaphora (pronominal or lexical),
- subordinate clauses, both connective and circumstantial,
- first person substitution procedures,
- knowledge spatialisation procedures,
- syntactic compression procedures,
- lexical expansion and hierarchical structuring procedures

However, any such list of available facilities tells us nothing of how the actual discourse is organised, nor of the social factors by which it is governed.

We should of course add to the list:

- Formatives of Greek or Latin root
- Specialised abbreviations and ideograms.

However, it is surely wrong to concentrate on these specificities when students still have problems in simply coordinating, balancing and organising an argument, or even perceiving relations of cause and effect. And if this is not the role of language teaching for scientists, who else are they to turn to? The persistence of the vague notion of "general language" seems to indicate the extent to which discourse still remains an object of analysis and description without sufficient echo in the world of education.

Appropriate discourse, communication and reformulation

If the coherence of an argument, its adaptation to the target audience and the many rewrites it has to undergo in the process are so rarely a priority of our education programmes, then, by necessity, these areas have to be at the heart of language courses for scientists. We cannot continue ignoring these discursive and textual phenomena in our courses, nor can we simply pretend that they have already been addressed. These language courses cannot be confined to a simple verbalisation of a particular symbolism. Such limitation may be justified in an analytical perspective, but it is not necessarily directly applicable to teaching.

All argument, after all, produces highly structuralised discourse tailored to meet specific ends, and scientific discourse is not exempt from this procedure, which uses the same linguistic resources as ordinary language. However, the study of the discursive phenomena attached to any given situation illuminates the major role played by adaptation: a single discourse may require several reformulations in order to reach its desired audience.

In this respect, scientific discourse is socially-oriented. It is rooted in a world of established truths, a shared knowledge-base which it has to be able to evaluate and to which it must conform. These established criteria constitute the external foundation on which it can design its internal coherence and configuration.

A common ground of understanding has to be found before communication can be established, and so anticipatory skills have to be developed. Without this faculty of perceptive listening, which enables oral interaction with another's discourse and the collection of sufficient information on the other's state of knowledge, there can be no real communication nor any possibility of writing a readable text that is acceptable to the intended reader.

Coherence Studies

Our first task is therefore to perfect our students' ability to adapt their arguments to a specific aim and a particular public, thereby ensuring that their arguments are internally and externally consistent. This task is more oriented towards the organisation of knowledge (language) than the knowledge itself (concepts), regardless of whether the object is to study in a foreign language or to communicate acquired intelligence. We have to learn how to exploit the linguistic resources mentioned earlier for a particular aim.
Nor is it possible to limit the teaching of discourse to a purely lexical problem, since it has to take account of two apparently contradictory movements: discourse has to be concentrated, without deviation, on a particular subject, whilst at the same time contributing new information to the subject; in other words, the teacher has to ensure both permanence and progression, continuity within a single developing theme.

The problem is quite simply the planning of discourse. Our specific role as teachers of language to scientists must therefore involve greater attention to this field, and we must never forget that before a language can claim to be a language of science it must first be able to communicate meaning.

The comprehension and production of "custom-built" discourse is a specific social and cultural objective, even if it goes beyond the actual specialities concerned. Our task is to provide students with the means to structure their thoughts in a foreign language, so that they have sufficient range to command attention and strike the appropriate chord.

In this respect, it is tempting to hazard the distinction between <u>resonating</u> discourse - i.e. genuinely scientific discourse aimed at arousing understanding from a recognised, common base of established concepts - and <u>ratiocinating</u> discourse, which has the prime aim of reasoning itself into the right and is therefore all too often drowned in mundane self-justification. Rationalities are not singular.

Our students have to be able to identify and reproduce these logical systems by process of comparison if they are to recognise and exploit, as and when required, the semantic condensation of scientific language (grasping or uttering a maximum of information in a minimum of words) or, on the contrary, to indulge freely in their own comments and value judgments.

It should be noted that these skills are not acquired in a "general" language course.

Science as it is rewritten

Another point that requires attention is that foreign language courses for scientists tend to accord too much priority to the written word. Writing is only one aspect of the scientist's work.

In fact, writing only concerns the results of research, and even then only when these results are promising. Consequently, in the interests of information, written science tends to draw a veil over the years of past research, let alone the science currently practised in the lab.
At this level, science is rewritten by the individual scientist or by a populariser, so that no vestige remains of the past exchanges with colleagues, the hesitations, doubts or intimate convictions, the tenacity in the face of failure or the sleepwalker-like approach that led to the discovery of something other than initially sought. In short, publication is a positive rewrite of a research report once research has yielded a result.

This "rewriting" process is a kind of mystification essential to the researcher both for social recognition and for obtaining the resources required for continued research. Its role is one of public relations. However, among the public, it has the perverse effect of any other mystification, in that society is given the impression that there are no failures and that science is the expression of Truth. This ambiguity is inherent to scientific discourse, because it is simultaneously a discourse of knowledge (cognition) and social persuasion (recognition).

Science as it is spoken

A study of science in action, in vivo, as it is spoken, reveals an entirely different world. Since the aim and the audience are different, the language is adapted. It becomes the language of team research, where the team shares a given objective.

Scientists need dialogue in order to exchange their knowledge and opinions. They have an absolute requirement for a language of common action with colleagues who often stem from entirely different cultures. To this end, they need an operational linguistic tool that enables them to give explicit expression to a given terminology and to a particular approach designed to make their action effective.

Setting up this linguistic apparatus is a much more complex task than simply manipulating instrumental vocabulary: although a scientific term gives expression to an abstract concept, it does not reduce the concept to a particular portion of reality nor confine it to a restrictive physical manifestation or to one single example.

The referential, pre-scientific illusion of using a quasi-material object (the word) to imprison mind in matter and impede its freedom of movement is an obstacle to the apprehension or creation of meaning. A concept is a mental object regarding reality. This mental representation (cognitive aspect) is incarnated in a verbal creation (semantic aspect) which has to conform to a constricting linguistic and social system (linguistic aspect).

The problem is therefore to be able to define terms and still allow the elaboration of concepts in the relevant language. Our own specific task concerns the language of exposition in all its forms. We are therefore preeminently concerned with appropriate handling of conversational argument and the logical cohesion of oral language.

However, this means more than a simple dialogue with a succession of questions and answers. The ability to intervene, to ask for details, to request confirmation and verification and to postulate hypotheses involves skills that scientists need in their everyday occupations: it is by these operations that scientists construct their indispensable instrument of research, the language of common action. Mutual understanding is a mechanism for coordinating action.

The language of common action

The entirety of mother-tongue education has to play its role. Without it, there is no faculty of conceptualisation or ability to abandon empiricism. Nobody is more acutely aware than the scientist that words are not the same thing as reality, nor even as our perceptions of it.

This critical attitude to words and reality cannot be learnt without challenging a number of assumptions that are deeply rooted in all cultures and civilisations, in which scientists are sometimes forced to play a dubious role.

In summary, the work of structuralising reality undertaken by the mind in order to communicate a "mental space" through the medium of words, and to give a condensed and generally accessible meaning to this space, calls into play more textual, social and critical skills than are normally imagined. However, these are precisely the skills that have to be developed when teaching a foreign language to scientists.

This effort of objectivisation stretches well beyond the limits of any particular specialism and highlights the extent to which all discourse is affected by social and ideological factors, even in its aspired - but never quite attained - ideal of detachment.

The field of language teaching for scientists has identified a number of different rationalities which have to be taken into account in all areas of language teaching.

One of the primordial aims of all language teaching is the development of comprehension skills, including the ability to generate and organise images in the foreign language through a variety of reformulations. These discursive skills are particularly indispensable to scientists. However, they require not only proficiency of expression but also the more broadly cultural qualities of listening, attention and adaptation.

END

U.S. Dept. of Education

Office of Education
Research and
Improvement (OERI)

ERIC

Date Filmed

March 29, 1991